“Sentinels” in the 2012 Stipulation Study)

NOAA FISHERIES

West Coast Region

California Central Valley Area Office

Barb Byrne

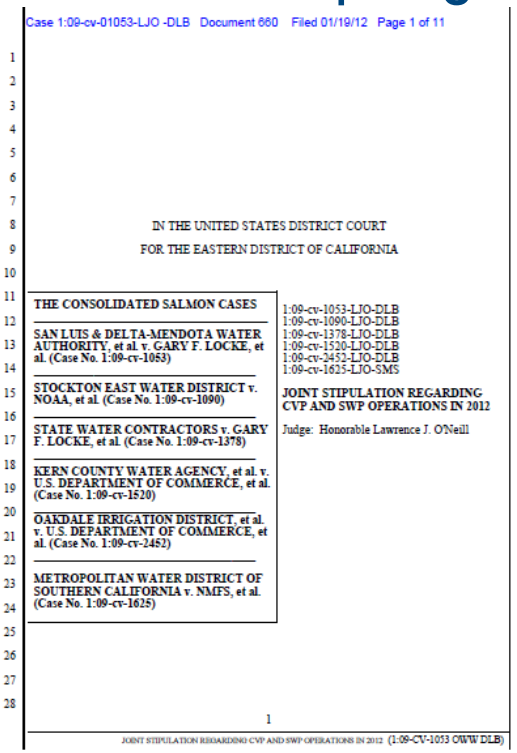
May 22, 2014

The 2012 Joint Stipulation

Action IV.2.1: Inflow:export ratio

San Joaquin Valley Classification	Vernalis flow (cfs):CVP/SWP combined export ratio
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750.

Alternative delta operations for spring 2012



Case 1:09-cv-01053-LJO -DLB Document 660 Filed 01/19/12 Page 1 of 11

IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

THE CONSOLIDATED SALMON CASES

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, et al. v. GARY F. LOCKE, et al. (Case No. 1:09-cv-1053)

STOCKTON EAST WATER DISTRICT v. NOAA, et al. (Case No. 1:09-cv-1090)

STATE WATER CONTRACTORS v. GARY F. LOCKE, et al. (Case No. 1:09-cv-1378)

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1:09-cv-2452-LJO-DLB
1:09-cv-1625-LJO-SMS

JOINT STIPULATION REGARDING CVP AND SWP OPERATIONS IN 2012

Judge: Honorable Lawrence J. O'Neill

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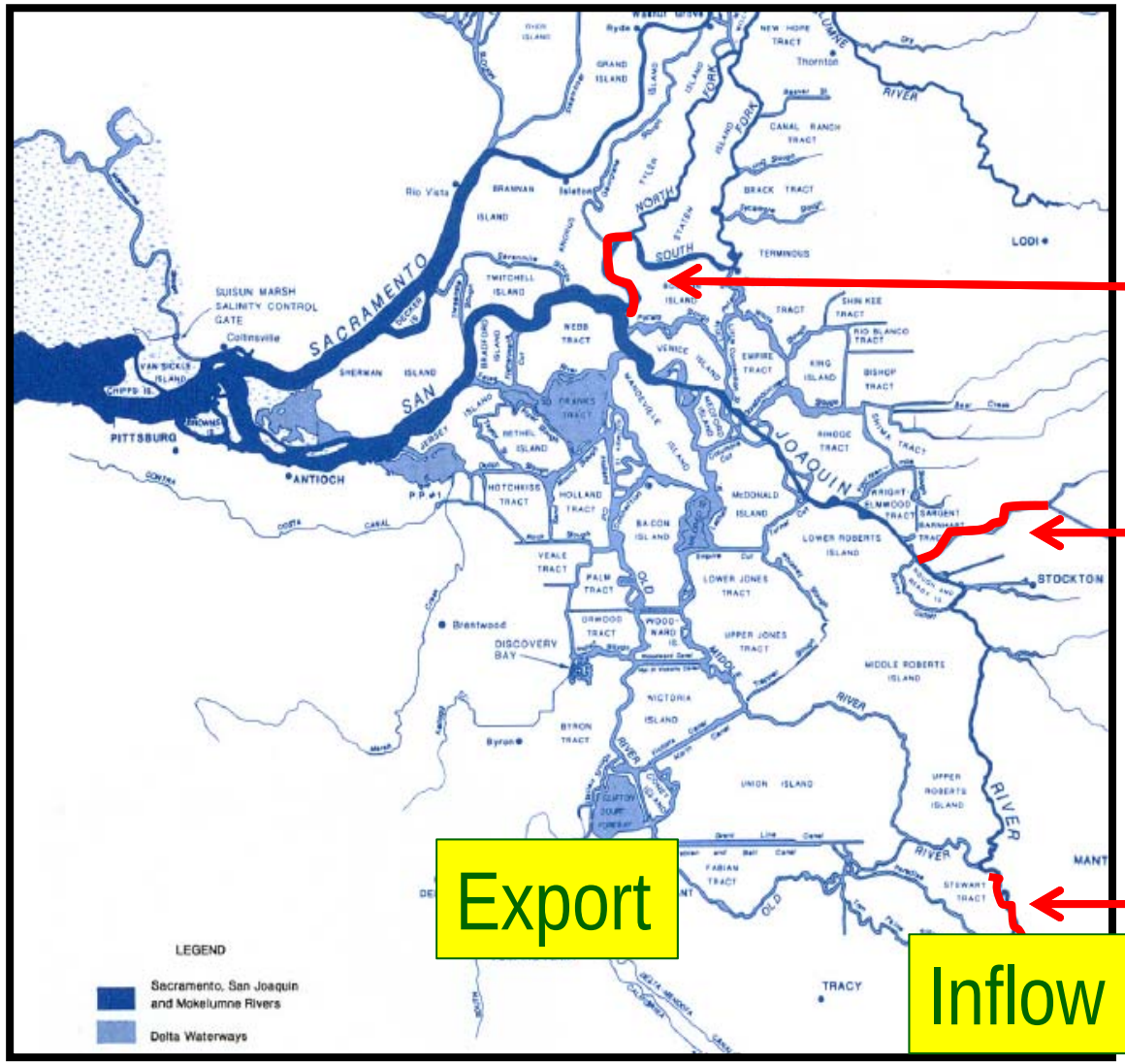
JOINT STIPULATION REGARDING CVP AND SWP OPERATIONS IN 2012 (1:09-CV-1053 OWW DLB)

IV.2.1 Objective: Protect San Joaquin basin steelhead

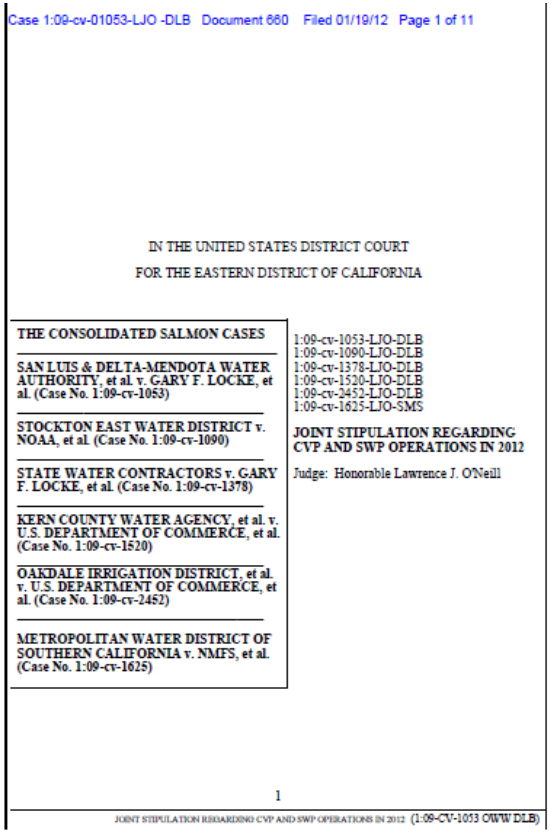


Mokelumne River

Calaveras River

"Middle" San Joaquin River

Some key elements of the Joint Stipulation



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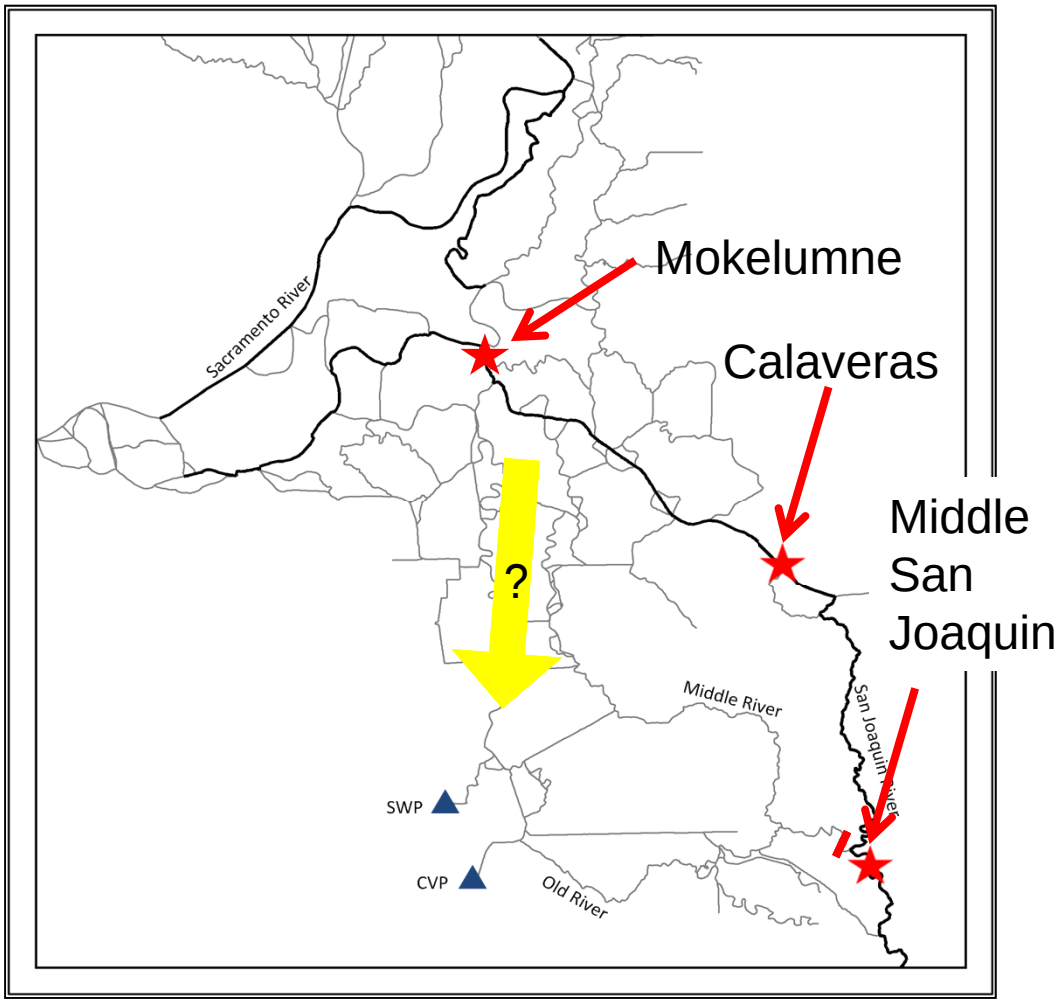
JOINT STIPULATION REGARDING CVP AND SWP OPERATIONS IN 2012 (1:09-CV-1053 OWW DLB)

- Preferential diversion at the CVP
- Rock barrier at head of Old River
- Adaptive range of Old and Middle River flows

Rock barrier at head of Old River has “downstream” effects

- Greater mainstem flow
- More negative OMR flows

Adaptive range of OMR flows in stipulation

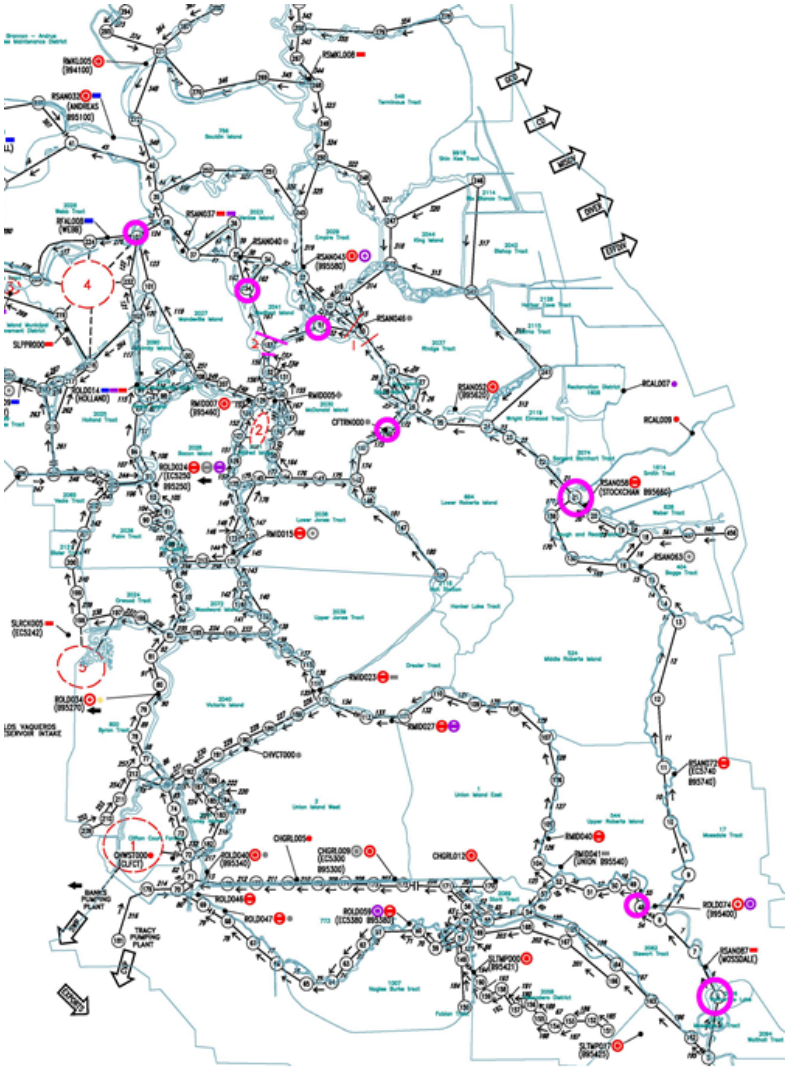


OMR Technical Memorandum

Managed-risk Experimental Approach

- Protect San Joaquin basin steelhead
- Test hypotheses about OMR flows on fish movement and survival

PTM → "sentinel steelhead"



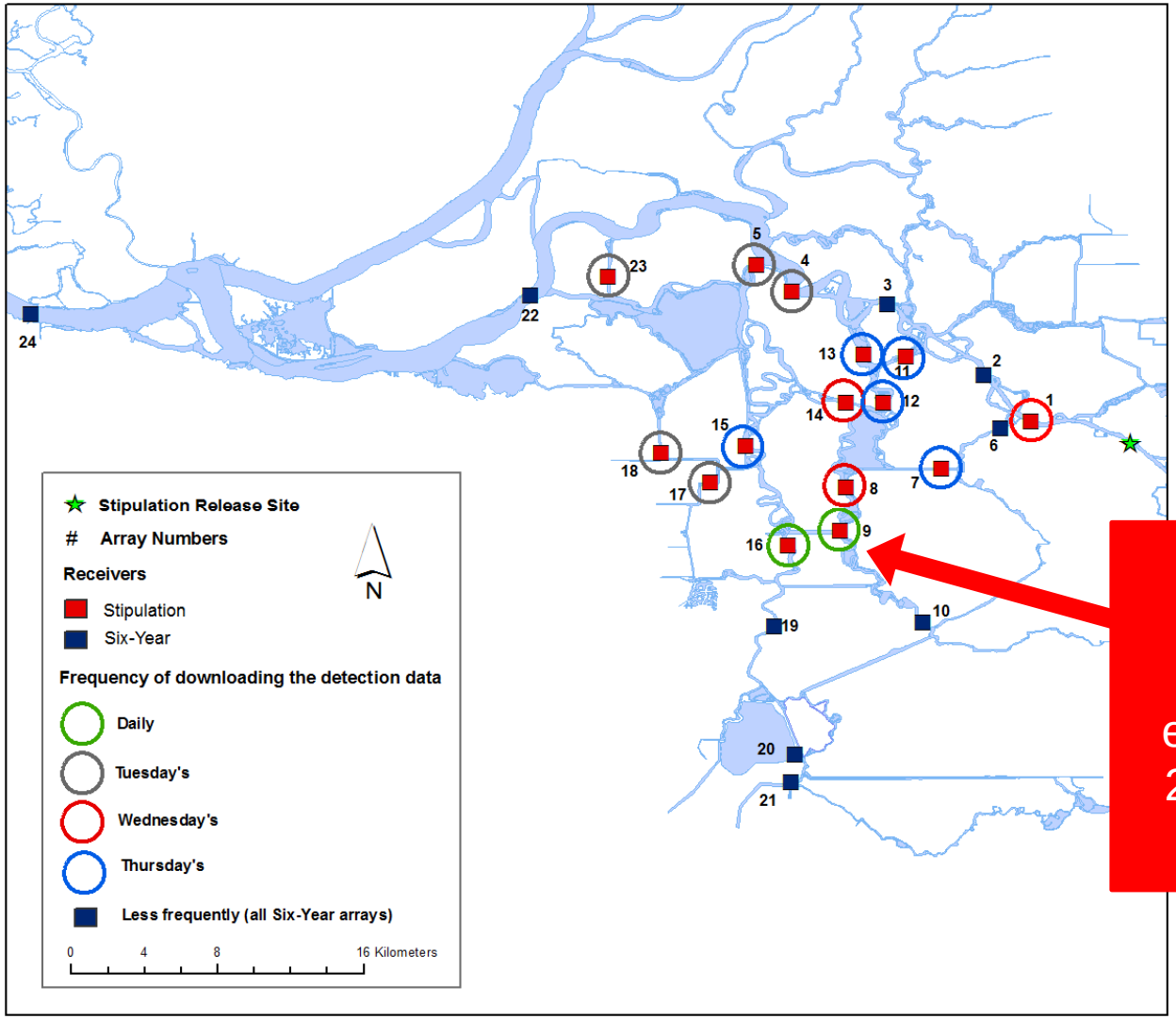
“Sentinel” approach to OMR management

- EXPERIMENTAL INFORMATION: Initial OMR levels

Management approach under joint stipulation	Period	OMR range allowed by stipulation	Planned Initial OMR
“sentinel” steelhead	April 15 – April 30	-1,250 to -3,500	-3,500* cfs
“sentinel” steelhead	May 1 – May 14	-1,250 to -5,000	-1,250* cfs
“sentinel” steelhead	May 15 – May 31	-1,250 to -5,000	-5,000* cfs

- PROTECTION OF STEELHEAD: -1,250 OMR, if exposure trigger exceeded

“Sentinel” approach to OMR management

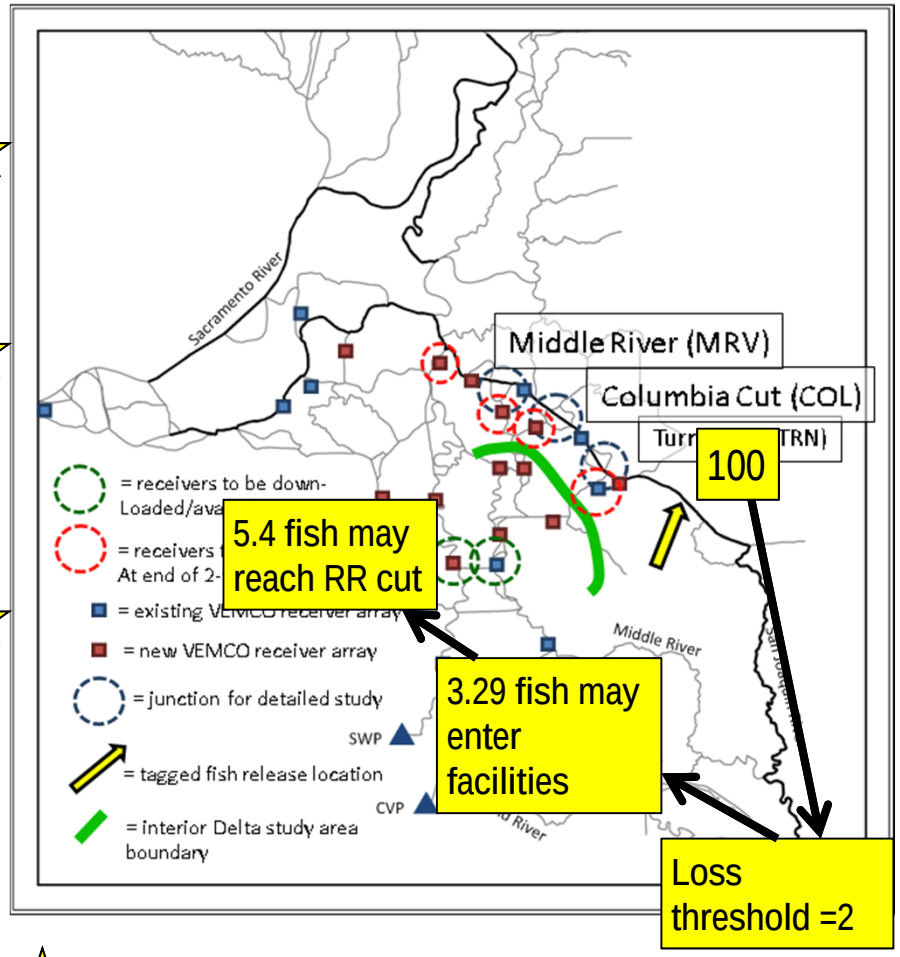


Railroad Cut exposure trigger “trips” at the level expected to result in 2% loss at the SWP and CVP

OMR Tech Memo – "sentinel" approach to OMR management

Key trigger components	Value
Number of Acoustically Tagged Fish Released Per Release Group	100
Assumed fraction of fish entering the CVP or SWP that enter the SWP (assumed equal to SWP exports as fraction of total exports)	0.5
Assumed survival rate per km between the Railroad Cut receivers and the CVP & SWP	97%
Railroad Cut Trigger (Number of tagged fish)	**5** *(5.4)*
Railroad Cut Trigger (Percentage of Tagged Fish Released)	5 %

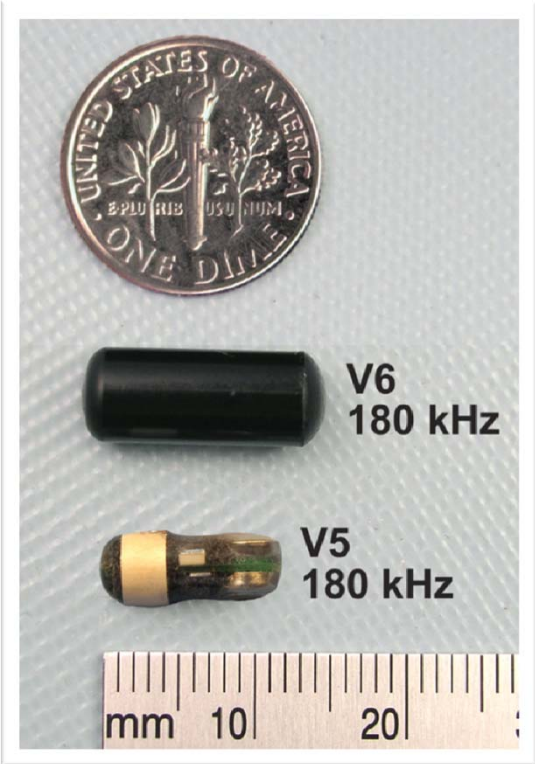
EXAMPLE



★ Fraction taking OR vs. MR route to facilities

2012 Stipulation Study acoustic tagging

- Hatchery steelhead were surgically implanted with an acoustic tag following 6 Year Study SOP
- 166 or 167 steelhead per each of 3 release groups



General (and obvious) consideration:

- Using sentinels as markers for naturally-produced and naturally-migrating fish is most effective when the timing of migration and behavior of sentinels matches that of target population

The problem of small sentinel fraction compounded by small (?) salvage fraction:

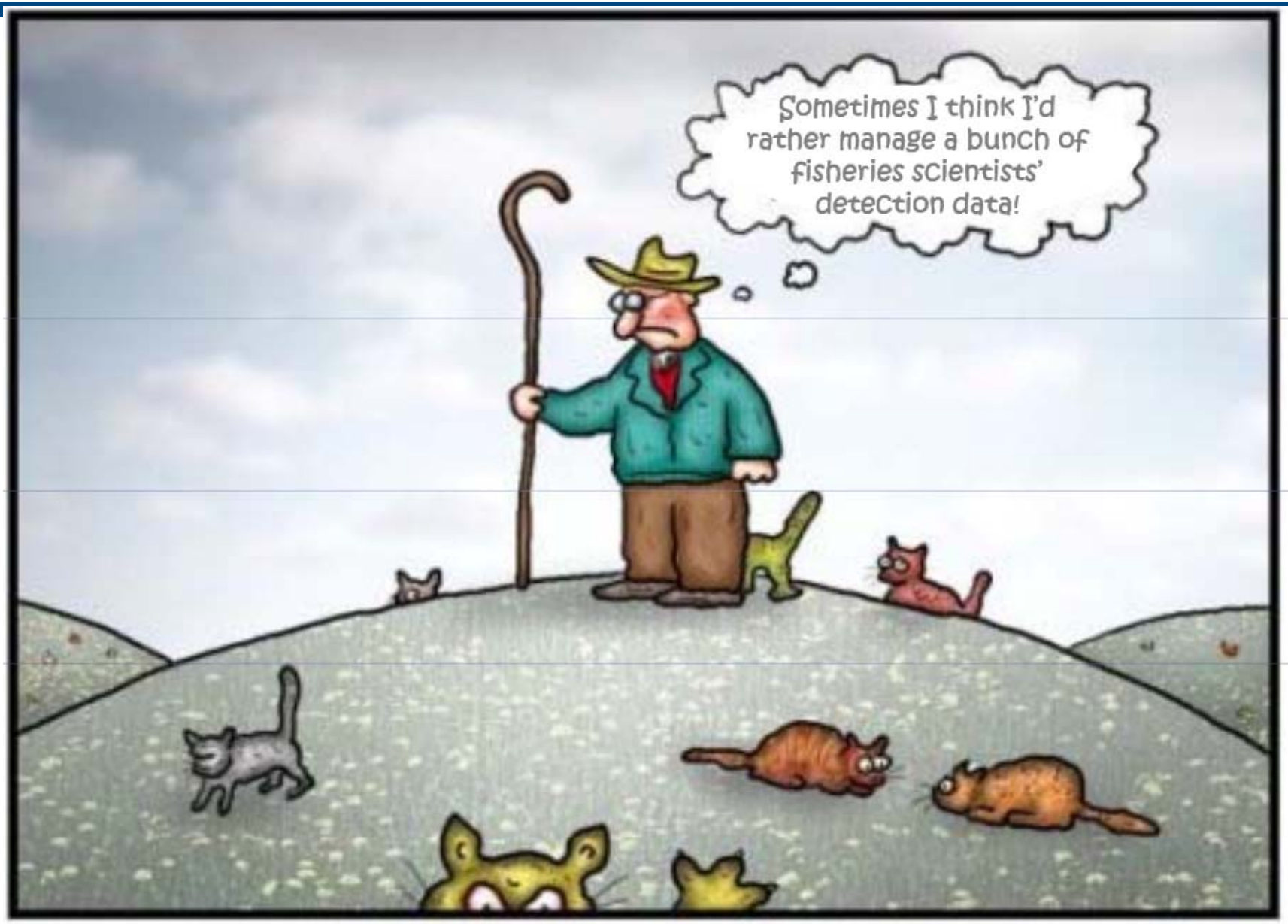
Suppose 1 sentinel is inserted for every 1000 naturally produced SJRRP fish.

	wild	sentinel	sentinel fraction	estimated wild SR salvage based on sentinel
Targeted sentinel fraction	1000	1	0.00100	
Actual sentinel fraction	800	1	0.00125	
	1300	1	0.00077	
Theoretical sentinel fraction in salvage	1000	1	0.00100	
Actual sentinel fraction in salvage	2	1	0.50000	1000
	3	0	0.00000	0

Considerations related to acoustic tags:

- Quick turn-around time on analysis of acoustic data is difficult, and limited

Tag ID	Site 2A	Site 2B	Site 3A	Site 3B	Site 3C	Initial Date Detected
A180-1702-20846/7			X	X	X	5/2/12
A180-1702-21962/3			X	X	X	5/2/12
A180-1702-28780/1			X	X	X	5/2/12
A180-1702-21960/1	X	X	X	X	X	5/3/12
A180-1702-2950/1			X	X	X	5/3/12
A180-1702-2960/1			X (NV)	X	X	5/3/12
A180-1702-20850/1			X	X	X	5/3/12
A180-1702-24850/1			X	X	X	5/3/12
A180-1702-21972/3	X	X	X	X	X	5/3/12
A180-1702-5384/5			X (NV)	X (NV)	X	5/3/12

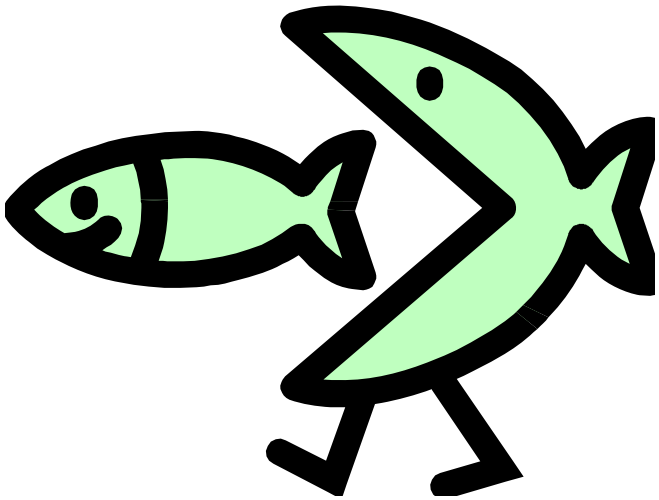


The daydreams of cat herders

Credit to Lori Brown:
http://www.nero.noaa.gov/prot_res/atlsturgeon/wsdoc/day2/Research%20Updates/Brown_ACT_sturgeon_workshop.pdf

Considerations related to acoustic tags:

- Quick turn-around time on analysis of acoustic data is difficult, and limited
- Uncertainty exists about whether acoustic tag detection represents live study fish, eaten study fish, or defecated tag.



Considerations related to acoustic tags:

- Quick turn-around time on analysis of acoustic data is difficult, and limited
- Uncertainty exists about whether acoustic tag detection represents live study fish or eaten study fish
- Acoustic tags and receivers are expensive

Considerations related to acoustic tags:

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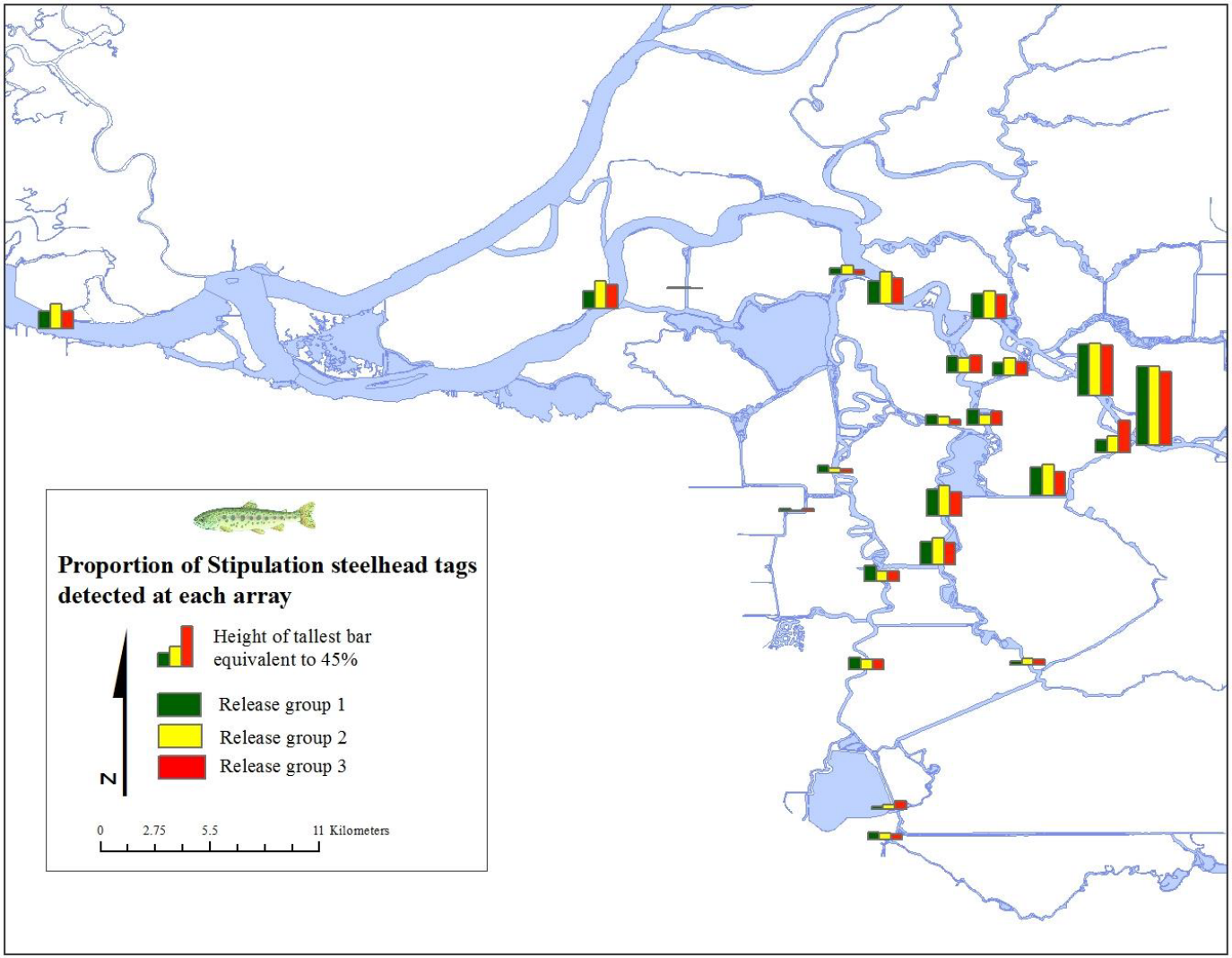

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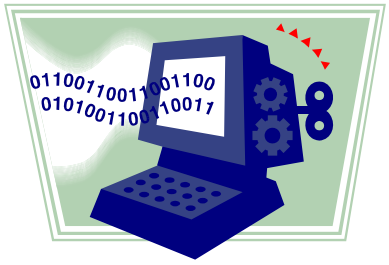
Considerations related to acoustic tags:

- Quick turn-around time on analysis of acoustic data is difficult, and limited
- Uncertainty exists about whether acoustic tag detection represents live study fish or eaten study fish
- Acoustic tags and receivers are expensive
- With wide receiver array, can get a lot of interesting spatial data!
- Slow data turnaround may, over time, be improved as analysis is automated.



Summary

- Representativeness
- Sentinel fraction x salvage fraction issue
- Quick turn-around time on analysis of acoustic data is difficult, and limited
- Uncertainty exists about whether acoustic tag detection represents live study fish or eaten study fish
- Acoustic tags and receivers are expensive
- With wide receiver array, can get a lot of interesting spatial data!
- Slow data turnaround may, over time, be improved as analysis is automated.